

Unified Framework for Graphical Authoring and Visual Debugging of PLEXIL, SCL and PRL Programs, Phase I

Completed Technology Project (2009 - 2009)



Project Introduction

Execution and monitoring of command plans are central for spacecraft operations. Diverse execution engines and languages exist to define such command plans. Language dependent development tools have been created for such languages. However, there is not a reusable framework and code base that can be used to create such automation tools even though there are many commonalities in the functionality and form of such tools. As a consequence, existing automation tools cannot be easily adapted across missions or languages. We proposed the development of an authoring and debugging framework for the definition of spacecraft operation plans. The framework provides a reusable code base that facilitates the creation of authoring and debugging tools tailored to a particular language and particular user type. Traditional text based authoring will be complemented with graphical representations of plans that provide friendly abstractions of a language's low level execution details. Traditional in-line debugging techniques will be enhanced with context-based visual debugging techniques suitable to understand the rationale of why a plan or rule has been applied and the interactions between different plans running in parallel. The Phase I prototype will illustrate the utility of the proposed framework by developing editors and debuggers for PLEXIL and SCL.

Anticipated Benefits

The technology will complement Stottler Henke's own advanced automation toolkits such as SimBionic and its MadCap real-time planning system used for controlling intelligent simulated agents in training, wargaming, and entertainment games. These toolkits are used by the U.S. Department of Defense and its contractors to develop and operate semi-autonomous systems such as unmanned vehicles as well as non-robotic software agents. The proposed framework for graphical authoring and visual debugging will provide NASA with a unified toolkit with enough out of the box functionality to reduce the time and manpower needed to build IDEs for NASA command languages. The use of the APIs here proposed will facilitate the reuse and adaptation of related tools created by different NASA groups, like the Planning and Scheduling group at NASA Ames.



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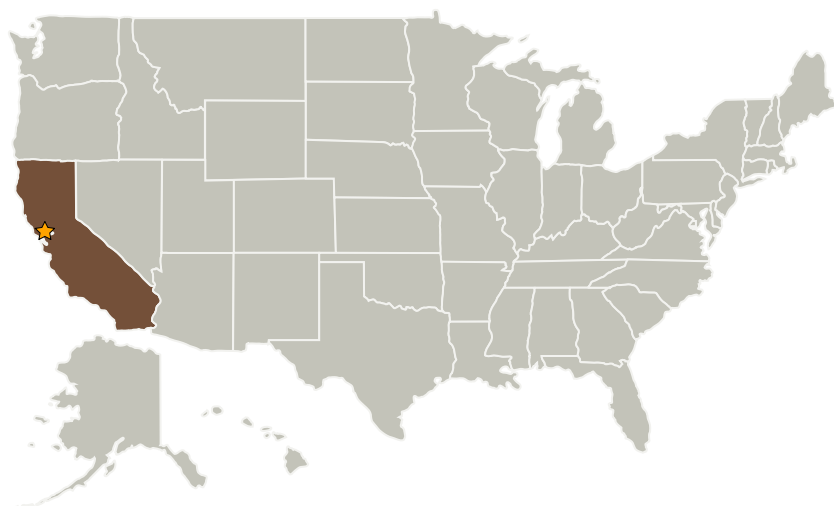
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Stottler Henke Associates, Inc.	Supporting Organization	Industry	San Mateo, California

Primary U.S. Work Locations

California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Jeremy D Frank

Principal Investigator:

Emilio Remolina

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Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - └ TX11.1 Software Development, Engineering, and Integrity
 - └ TX11.1.7 Frameworks, Languages, Tools, and Standards